PART 531 ENGINEERING GEOLOGY

SUBPART A - GEOLOGIC SITE INVESTIGATION

IN531.03 Requirements for preliminary geologic investigations

(a) Minimum Requirements

Explorations for structures requiring approval of the Indiana Department of Natural Resources, Division of Water, must meet their requirements for soils information. Explorations for livestock waste holding facilities requiring approval of the Indiana Department of Environmental Management must meet their requirements for soils information for a Confined Livestock Feeding Facility permit. Exhibit A provides guidance for animal waste lagoons explorations.

Soils and geologic considerations are also essential to the proper planning, design and construction of many conservation practices. Chapter 4 of the Engineering Field Handbook contains a guide for determining the need for soil borings for various conservation practices.

Sufficient data will be obtained to permit development of final land rights work maps for project activities.

IN531.11 Preserving, transporting, and storing soil and rock samples

(a) Sample size

Geology Note 5 “Soil Sample Size Requirements for Soil Mechanics Laboratory Testing” shall be followed when collecting samples for laboratory analysis.

INDIANA NRCS
ANIMAL WASTE SITE EXPLORATIONS

I. SITE DESCRIPTION

The purpose of the site exploration is to document the engineering properties of the soil and the pollution potential of the site.

All soils explorations for animal waste shall be conducted by an engineer, geologist and/or soil scientist. The site shall be explored through the excavation of a pit that extends at least two feet below the planned bottom for concrete pits, ten feet below for soils in karst topography, and five feet below for all others unless sound bedrock is encountered and a professional determination is made that the depth is adequate. The soil profile shall be logged from the ground surface to the bottom of the pit using the Unified Soil Classification System (USCS). Identify depth in the pit where the USCS class changes. Horizons with a thickness of three (3) inches or less should be described as an inclusion in the surrounding material.

In the log of the pit, identify the depth of the water table observed in the pit and the seasonal high water table. Document the indicators used to identify these features.

Identify in the log of the test pit the parent material. If bedrock is encountered, the location and type of rock shall also be logged.

Other characteristics of the soil that could affect the construction process and the pollution potential of the site shall also be noted. These could include macropores from burrowing animals, plant roots, etc. that offer a preferred pathway for contaminant movement if the seal of the compacted clay liner is broken or fractures in dense till that would allow contaminants to travel to potential ground or surface water sources. Another example might be cutbank caving (unstable, saturated sands) that would affect construction of the clay liner.

The number of soil pits per site will depend on the complexity of the soils and the topography of the site. At least two (2) pits should be logged for sites up to ½ acre and a minimum of one (1) additional pit logged for each ½ acre increase in size. For complex or environmentally sensitive sites, additional holes should be explored based on the best professional judgement of the investigator.

II. SAMPLING

If a compacted clay liner will be used in the facility, a sample of the soil, which will be used for the liner, shall be collected for soil mechanics testing.

Samples will be collected from the proposed site of the animal waste lagoon or the proposed borrow area. Preliminary borings should be made to help identify where to place the test pit. If the borings or test pit indicate that the site is hazardous (for example, you encounter several feet of saturated sands) you should notify the landowner and discuss the possibility of relocating the animal waste lagoon before continuing. If no

suitable materials are found from the proposed site of the animal waste lagoon, work with the landowner to identify a borrow area. In these situations, you should include a site

description from test pits at the proposed site of the animal waste lagoon and the borrow area.

A fifty (50) pound sample is the minimum required for samples sent to the NRCS Soil Mechanics Lab in Lincoln, Nebraska. Check with private labs for their samples size requirements. Log the depth from where the sample was taken (i.e. 24" to 48" or 2 to 4 feet) and include this in the description of the pit.

Soil samples for soil mechanics testing should be placed in heavy-duty plastic bags with a minimum of 6-mil thickness. One sample tag should be placed inside the bag and another attached to the outside. Sample bags should be sealed with a tie or staples to preserve the moisture content of the sample.

III. TESTING

Soil samples shall be sent to testing facilities that are capable of performing the following tests:

1. Unified Soil Classification (ASTM-D422/2487)
2. Standard Proctor Moisture-Density Relationship (ASTM-D698)
3. Flexible Wall Permeability (ASTM-D5084)

For each sample, the report from the testing facility should include:

Classification

1. Table of gradation analysis
2. Atterberg Limits (liquid limit and plasticity index)
3. Unified Soil Classification

Standard Proctor Moisture-Density Relationship

4. Graph of moisture-density relationship
5. Maximum dry density
6. Optimum moisture content
7. In-place moisture content

Flexible Wall Permeability

8. Permeability in units of centimeters per second (cm/s)
9. Standard proctor and moisture content for each permeability test

IV. REPORTS

Reports for animal waste lagoon site explorations should include a description of the soils observed in the pits, observed water table elevation, seasonal high water table and other environmental considerations in regard to the pollution potential of this site. The report should also include: (1) a site map showing the location of existing structures, the location of test pits, the proposed animal waste lagoon and additional borrow areas if necessary; (2) a log of each test pit; (3) a copy of the soil mechanics report; (4) a judgement of the suitability of the soil materials on-site for construction of a compacted

clay liner; (5) a judgement of the environmental sensitivity and suitability of the site for construction of an animal waste storage facility; and (6) documentation of assumptions and judgements made in the report.